

**MEMORANDUM**

**SUBJECT:** Documentation of a Removal Action at the Clute Texas Mercury Site, Clute, Brazoria County, Texas.

**FROM:** Roberto Bernier, On-Scene Coordinator  
Response and Prevention Branch, Removal Team (6SF-PO)

**THRU:** Ragan Broyles, Chief  
Response and Prevention Branch (6SF-R)

**TO:** File

**I. PURPOSE**

This Memorandum confirms and documents the prior oral authorization of an emergency removal action in accordance with the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9604, at the Clute Texas Mercury Site located in Clute, Brazoria County, Texas. This emergency removal action provided for the removal of the threat to human health and the environment posed by mercury contamination in a residence.

The proposed plan of action meets the criteria for initiating a removal action under Section 300.415 of the National Contingency Plan (NCP), 40 C.F.R. § 300.415. This action was initiated under the On-Scene Coordinator's \$250,000 authority on July 3, 2008. This action required less than twelve months and \$2 million to complete.

BERNIER:6SF-PO:X8376:re:9/11/08

WEBSTER  
6SF-PR

JOHNSON  
6RC-TE

PEYCKE  
6RC-S

## II. SITE CONDITIONS AND BACKGROUND

CERCLIS: TXN000606879  
Category of Removal: Classic Emergency Removal  
Site ID: A6H7

### A. Site Description

#### 1. Removal site evaluation

On June 28, 2008, local authorities reported to the National Response Center (NRC No. 875602) that 3 private residences had been affected with approximately 6 pounds of mercury. *See* Attachment 1. A child found the mercury contained in a jar at his grandmother's residence garage and brought it inside the house to play. In the process, mercury was spilled in the house (front bedroom, hall, living room, den, and laundry room) and on soil by the front porch. In addition, some of the mercury was transferred to two additional properties by neighbor kids that also handled the mercury. On June 19, 2008, local emergency response teams responded to the two neighbor houses and after removing some contaminated items, declared the properties remediated by using a Jerome Mercury detector. Subsequent, the local response team responded to the source-house to remove visible elemental mercury, a contaminated section of carpet from the front bedroom, and contaminated soil from the front yard; however, operations were suspended due to lack of funding. At this point, the residence was closed and secured by the local authorities with the occupants of the house relocated with relatives. Sometime around June 23, 2008, the grandmother at the affected source residence and the grandson were taken to local medical facilities for mercury screening but neither was found to be significantly affected.

On July 3, 2008, EPA mobilized its Superfund Technical Assistance and Response Team (START-3) contractors to the incident location to assess the situation and perform analytical screening of the source-house for mercury vapors using a 915+ Lumex Mercury Analyzer (Lumex). Initial readings outside the front door of the residence were  $91 \text{ } \Phi\text{g}/\text{m}^3$  at 4 foot off the ground and  $>25 \text{ } \Phi\text{g}/\text{m}^3$  at 1 foot off the ground. Just inside the front door the readings were  $41 \text{ } \Phi\text{g}/\text{m}^3$  at 4 foot off the ground and  $>84 \text{ } \Phi\text{g}/\text{m}^3$  foot off the ground. In all, most of the front portion inside the house was significantly above the residential screening level for mercury contamination in a home of  $10 \text{ } \Phi\text{g}/\text{m}^3$ . After conferring the results with the local authorities, START-3 left the site to coordinate removal activities with the responding OSC. The EPA, EPA Emergency and Rapid Response Services (ERRS) and START-3 contractors mobilized to the site on July 8, 2008, to begin assessment and removal activities.

#### 2. Physical location

Site was located at (b) (6) Clute, Brazoria Co., Texas. *See* Attachment

2.

3. Site characteristics

The site is a single family property in a residential neighborhood in Clute, Texas. Air monitoring with the Lumex indicated mercury levels in excess of  $85 \text{ } \Phi\text{g}/\text{m}^3$ , which is above the residential screening level for mercury contamination in a home where a spill has occurred of  $10 \text{ } \Phi\text{g}/\text{m}^3$ . The higher Lumex readings were mostly noted in the front section of the house, in specific the front bedroom, the hall, living room, and den, but high reading were obtained from the laundry room in the back and house drains. The EPA witnessed the presence of substantial amounts of free mercury inside and outside of the property.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The EPA documented the release of mercury into the environment based on mercury vapor detection with the Lumex and information provided by the local emergency management response team. The EPA specifically documented the release of mercury in the residence, measuring mercury vapors in excess of  $85 \text{ } \Phi\text{g}/\text{m}^3$ . Approximately 4 pounds of free mercury were collected from in and around the residence. Further releases to the environment could have occurred if this elemental mercury had not been collected. Mercury is a hazardous substance as defined by Section 101(14) of CERCLA, 42 U.S.C. ' 9601(14), and further defined at 40 C.F.R. ' 302.4.

5. NPL status

This site is not on the National Priorities List (NPL). The removal action eliminated the necessity for additional action.

6. Maps, pictures and other graphic representations

Attachment 1 NRC Report

Attachment 2 Site Location

Attachment 3 Agency for Toxic Substances and Disease Registry (ATSDR) Fact Sheet on Mercury

Attachment 4 ATSDR Suggested Action Levels

B. Other Actions to Date

1. Previous actions

The EPA had taken no previous actions at the site.

2. Current actions

No ongoing actions. Removal activities are completed with confirmation samples taken on August 5, 2008. All results were below the residential re-occupancy standard of  $1 \text{ } \Phi\text{g/m}^3$ .

C. State and Local Authorities' Roles

1. State and local actions to date

The Clute Fire Department and the Brazoria County Emergency Management Response Team initiated the response by removing the initial jar still containing a substantial amount of elemental mercury and removing certain contaminated items from the residence and surroundings. This included a section of the front bedroom carpet and scrapping soil from the front yard, both to remove visible mercury. The local response team also initiated heating and venting rotations on the residence until the EPA arrived at the site to initiate operations. All the recovered mercury and contaminated items by the local response team were placed in approved containers and handed to EPA for proper disposal. The local authorities also cleared two other neighboring residences where mercury was transferred to by removing certain items and screening for mercury vapors with a Jerome meter.

2. Potential for continued State/Local response

None at this point

**III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a removal action. Paragraphs (b)(2)(i) and (vii) directly apply to the conditions at the site. Any one of these factors may be sufficient to determine whether a removal action is appropriate.

A. Threats to Public Health or Welfare

**1. Exposure to human populations, animals or the food chain, NCP Section 300.415(b)(2)(i)**

The predominant threat to human populations was the potential for exposure by direct contact with elemental mercury and/or inhalation of mercury vapors. Residents living in the contaminated residence were affected by the release of mercury, which is a hazardous substance

as defined at Section 101(14) of CERCLA, 42 U.S.C. ' 9601(14) and further defined at 40 C.F.R. ' 302.4. Rapid response to remove the mercury prevented the residents at the site from being acutely poisoned from exposure to mercury.

The EPA arranged for the recycling and/or disposal of elemental mercury collected during the response. Approximately 60 cubic yards of mercury contaminated material, including soil, carpet, furniture, clothes and children=s toys. If the EPA had not collected elemental mercury and mercury contaminated debris, mercury could have been released into additional homes, schools and businesses as residents may track mercury off-site on their shoes, clothes, etc.

Volatilization of elemental mercury contained within this residence posed a continued threat of airborne exposure to people within the house. In this case, persons entering the residences would have been exposed to mercury vapors. Air monitoring data from the Lumex screening showed levels in excess of 85  $\Phi\text{g}/\text{m}^3$ . Routes of exposure to mercury include inhalation, skin absorption, ingestion, and skin and/or eye contact. According to the ATSDR, breathing mercury vapors causes the most harm because more mercury in this form reaches the brain. Exposure to the high levels of metallic mercury can permanently damage the brain, kidneys, and developing fetus.

Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. Short-term exposure to high levels of metallic mercury vapors may also cause other effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation. *See Attachment 3.*

## **2. Availability of other response mechanisms, NCP Section 300.415(b)(2)(vii)**

Assistance would not have otherwise been provided on a timely basis. Neither the City of Clute Fire Department nor the Brazoria County Emergency Management had the necessary resources to complete a full response to this release. Both agencies took initial actions to remove some of the elemental mercury but did not have the resources to carry on a full and appropriate response.

### **B. Threats to the Environment**

Nearby wildlife may have been exposed to and harmed by mercury that was improperly deposited outside the residence. Evidence of wildlife dwellings was noted under the house foundation. Mercury can accumulate in the food chain, particularly in the tissues of fish. In this case, however, the potential threat to the environment was considered secondary to the threat to residents and other persons.

## **IV. ACTIONS TAKEN AND ESTIMATED COSTS**

## A. Actions Taken

### 1. Action description

The EPA initiated a classic emergency removal action on July 3, 2008 and mobilized START-3 to monitor and assess the home where the spill occurred as well as possible sites of cross contamination. On July 8, 2008 EPA mobilized the ERRS contractors to provide support in the removal of mercury contamination.

Air monitoring in the residence where the spill occurred indicated mercury levels in excess of  $85 \text{ } \Phi\text{g}/\text{m}^3$ . The residential screening level for mercury contamination where a spill has occurred is  $10 \text{ } \Phi\text{g}/\text{m}^3$ . In addition, EPA witnessed the presence of substantial amounts of free mercury in and around the home, in specific the front bedroom and outside around the front porch area, including the surrounding soil. In addition, based on information from the property owner, at least one load of mercury contaminated clothing was put through a washing cycle in the laundry room.

Removal activities began with the careful collection of free mercury from the house floors using pipits and a mercury (merc) vacuum. Once all visible mercury was collected from the inside, personal belongings and furniture in the house were bagged to be placed outside. Personal items above action levels ( $10 \text{ } \Phi\text{g}/\text{m}^3$ ) were placed on a secured area outside for solar heating and aeration as an attempt to reduce mercury vapors. Approximately 65% of those personal belongings exceeded action levels and were put into two 20 cubic yard roll-off boxes for disposal.

After the house was emptied, decontamination efforts resumed, including removing carpets, merc vacuum, caulking cracks and seams, and applying mercury sorbent soap, chemical resistant paint and epoxy to the flooring. Afterwards, the house was screened with the Lumex several times to determine remaining Ahot@ spots and continue decontamination efforts. In addition, house heating and fan venting rotations continued to reduce and dissipate mercury vapors.

During the decontamination efforts, the Lumex continued measuring mercury vapors within the home around the  $2.5$  to  $4.0 \text{ } \Phi\text{g}/\text{m}^3$  range, which is above the ATSDR residential re-occupancy level of  $1 \text{ } \Phi\text{g}/\text{m}^3$ . See Attachment 4. An investigation of the area around the porch uncovered a large amount of mercury hidden under the tall grass and additional beads incrustated within the veneer siding of the structure. As a result, mercury readings around the porch were in excess of  $100 \text{ } \Phi\text{g}/\text{m}^3$ . It appeared that due to barometric pressure inversion, vapors from this source contributed to the high readings indoors by seeping through the crawl space under the home and through seams and crack in the siding. After removing the visible mercury from the area, several measures were taken for the decontamination. These included soil excavation, siding removal and replacement, mercury sorbent treatment, merc vacuum, and the application of lime, poly

plastic and top soil as a precaution barrier. Subsequently, the Lumex measured reduced mercury vapors within the home from 1.2 to 2  $\Phi\text{g}/\text{m}^3$ .

EPA periodically monitored mercury levels within the home while continuing more heating and venting rotations. Once mercury vapor levels have degraded below the 1  $\Phi\text{g}/\text{m}^3$  standard, confirmation samples were conducted inside the home. A total of 8 confirmation samples including QA/QC samples were taken. The results were below the ATSDR re-occupancy standard.

2. Contribution to remedial performance

This action was consistent with any conceivable remedial responses at this site. The threat posed by this site was mitigated by controlling the source. Once the threat was eliminated there remained no further need for a CERCLA response.

3. Description of alternative technologies

There were no alternative technologies which could be feasibly applied.

4. Schedule

The EPA initiated a classic emergency removal action on July 3, 2008. EPA mobilized START-3 contractors to the site on July 3, 2008 to begin assessment activities and ERRS contractors to the site on July 8, 2008 to initiate removal activities. Confirmation samples were completed on August 5, 2008 and contractors demobilized from the site on August 9, 2008 after moving personal household items back into the house.

B. Estimated Costs

**Extramural Costs:**

<b>ERRS</b>	<b>\$</b>	<b>75,000</b>
<b>START-3</b>	<b>\$</b>	<b>50,000</b>
<b>TOTAL EXTRAMURAL COSTS</b>	<b>\$</b>	<b>125,000</b>

**V. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

If this response action was not taken at the residence, residents would continue to be exposed to mercury contaminated furniture and personal belongings, as well as other citizens who came into contact with these things or entered the house. A substantial threat of transporting mercury to outside receptors would have created a larger area of contamination

## **VI. OUTSTANDING POLICY ISSUES**

There are no outstanding policy issues associated with this site.

## **VII. ENFORCEMENT**

The total for this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be **\$ 228,915**.

(Direct Cost) + (Other Direct) + 52.61% of Total Direct { Indirect Cost } =  
Estimated EPA Cost for a Removal Action

$$\text{\$ 125,000} + \text{\$ 25,000} + (52.61\% \times \text{\$ 150,000}) = \text{\$ 228,915}$$

Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2002. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only, and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor the deviation of actual total costs from this estimate will affect the United States= right to cost recovery.

## **VIII. RECOMMENDATION**

This decision document represents the selected removal action for the Clute Texas Mercury site, in Clute, Brazoria County, Texas, developed in accordance with CERCLA, 42 U.S.C. § 9601 et seq., and not inconsistent with the NCP, 40 C.F.R. Part 300. This decision is based on the administrative record for the site.

Conditions at the site met the criteria as defined by Section 300.415(b) (2) of the NCP, 40 C.F.R. § 300.415(b) (2), for a removal, and I recommend your formal approval of the documented removal action. The total project ceiling is \$ 160,000.



Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
Samuel Coleman, P.E., Director  
Superfund Division

Attachments

## Clute Texas Mercury AM Attachment 1

Submit Action Report

Spill Summary Report

NATIONAL RESPONSE CENTER 1-800-424-8802

\*\*\*GOVERNMENT USE ONLY\*\*\*GOVERNMENT USE ONLY\*\*\*

Information released to a third party shall comply with any  
applicable federal and/or state Freedom of Information and Privacy Laws

Incident Report # 875602

INCIDENT DESCRIPTION

\*Report taken by: E4 KATIE WILSON at 10:52 on 28-JUN-08

Incident Type: FIXED

Incident Cause: OTHER

Affected Area:

The incident was discovered on 17-JUN-08 at 09:00 local time.

Affected Medium: OTHER 3 PRIVATE RESIDENCES

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REPORTING PARTY

Name: ANONYMOUS

PRIMARY Phone: (111)1111111

Type of Organization: OTHER

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SUSPECTED RESPONSIBLE PARTY

Name: UNKNOWN

Type of Organization: UNKNOWN

---

INCIDENT LOCATION

(b) (6) County: BRAZORIA

City: CLUTE State: TX

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RELEASED MATERIAL(S)

CHRIS Code: MCR Official Material Name: MERCURY

Also Known As:

Qty Released: 6 POUND(S)

Qty in Water: 0 UNKNOWN AMOUNT

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DESCRIPTION OF INCIDENT

CALLER IS REPORTING THAT THERE WAS A RELEASE OF SIX POUNDS OF MERCURY IN A PRIVATE RESIDENCE. IT WAS DISCOVERED THAT A YOUNG BOY HAD FOUND THE MERCURY AND PLAYED WITH IT IN THE RESIDENCE WITH FRIENDS. THE MERCURY WAS ALSO FOUND IN THE YARD AND ON THE PORCH OF THE SAME RESIDENCE. LATER IT WAS DISCOVERED THAT IT HAD CONTAMINATED TWO OTHER LOCATIONS. JUN 19TH AN EMERGENCY RESPONSE TEAM RESPONDED. CALLER STATES THAT OPERATIONS HAVE BEEN SUSPENDED FOR LACK OF FUNDING. AN NRC REPORT COULD NOT BE LOCATED.

## INCIDENT DETAILS

## IMPACT

		Hours	Direction of
<u>Closure Type</u>	<u>Description of Closure</u>	<u>Closed</u>	<u>Closure</u>
Air:	N		
Road:	N		M Ar
Waterway:	N		
Track:	N		

## REMEDIAL ACTIONS

## WEATHER

**ADDITIONAL AGENCIES NOTIFIED**

NOTIFICATIONS BY NRC

CHEM SAFETY AND HAZARD INVEST BOARD (WEEKEND)  
28-JUN-08 11:25 (202)3146290  
DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)  
28-JUN-08 11:25 (202)3661863  
EPA OEM (MAIN OFFICE)  
28-JUN-08 11:28 (202)5643850 FIELDING  
EPA OEM (WEEKEND CONTACT)  
28-JUN-08 11:28 (202)5643850 FIELDING  
U.S. EPA VI (MAIN OFFICE)  
28-JUN-08 11:31 (866)3727745 DUTY OFFICER  
FEDERAL EMERGENCY MANAGEMENT AGENCY (MAIN OFFICE)  
28-JUN-08 11:25 (800)6347084  
USCG COMMAND CENTER (MAIN OFFICE)  
28-JUN-08 11:31 (202)2672100 CCDO  
JFO-LA (COMMAND CENTER)  
28-JUN-08 11:25 (225)3366513  
NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)  
28-JUN-08 11:25 (202)2829201  
NOAA RPTS FOR TX (MAIN OFFICE)  
28-JUN-08 11:25 (206)5264911  
NATIONAL RESPONSE CENTER HQ (MAIN OFFICE)  
28-JUN-08 11:31 (202)2671136 NRCDO  
NTSB PIPELINE (MAIN OFFICE)  
28-JUN-08 11:25 (202)3146293  
HOMELAND SEC COORDINATION CENTER (MAIN OFFICE)  
28-JUN-08 11:25 (202)2828300  
TCEQ (MAIN OFFICE)  
28-JUN-08 11:25 (512)2392507  
TX DEPT OF STATE HEALTH SERVICES (COMMAND CENTER)  
28-JUN-08 11:25 (512)4587220  
TX GENERAL LAND OFFICE (MAIN OFFICE)  
28-JUN-08 11:25 (281)4706597  
TEXAS STATE OPERATIONS CENTER (COMMAND CENTER)  
28-JUN-08 11:25 (512)4242208

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ADDITIONAL INFORMATION

CALLER HAS NO ADDITIONAL INFORMATION.

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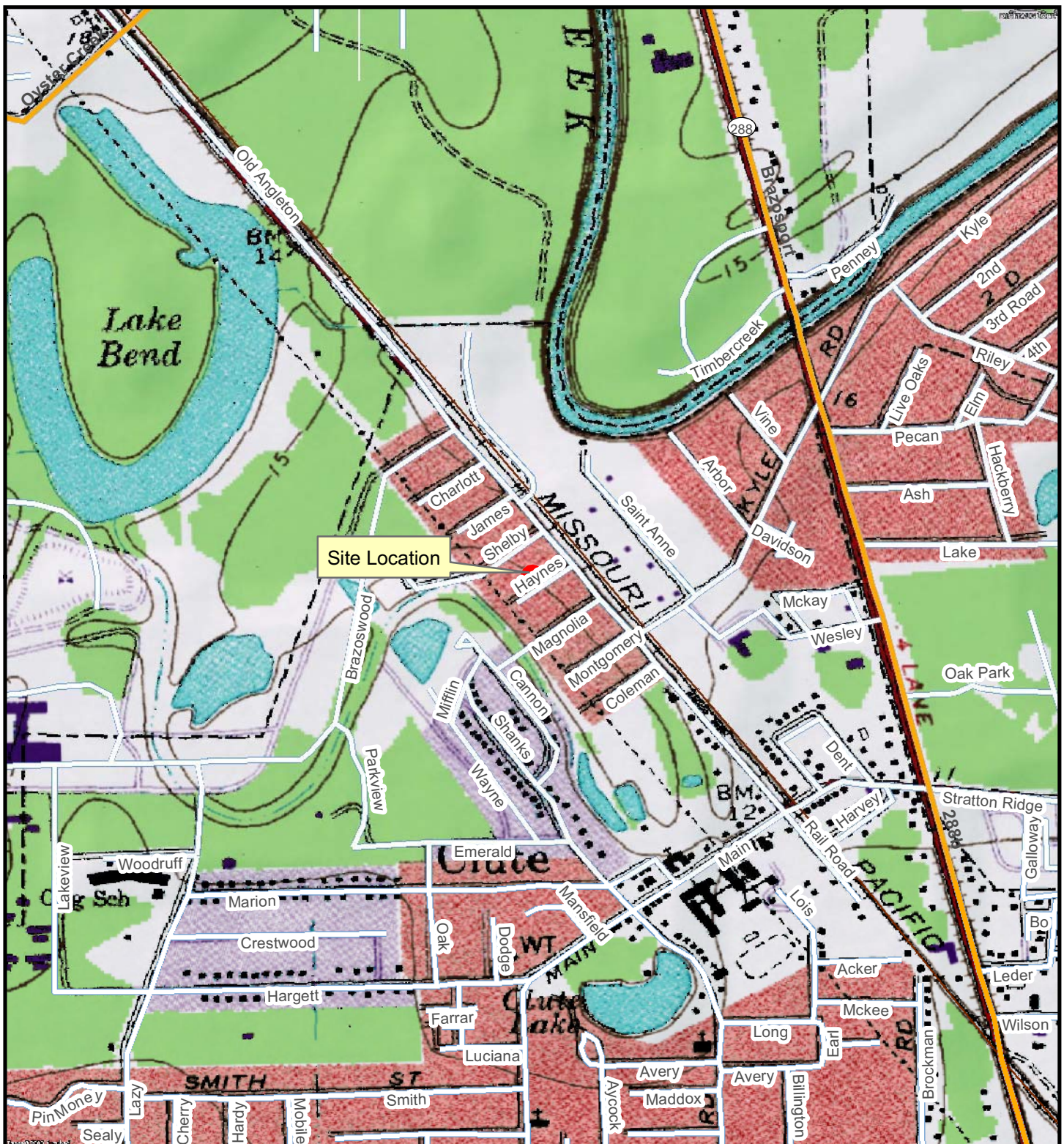
\*\*\* END INCIDENT REPORT # 875602 \*\*\*

Report any problems or Fax number changes by calling 1-800-424-8802

PLEASE VISIT OUR WEB SITE AT <http://www.nrc.uscg.mil>

Close Window





0 1,000 2,000  
SCALE IN FEET



**USEPA REGION 6  
START-3**

**FIGURE 2-1  
SITE AREA MAP**  
Clute Mercury Response  
Clute, Brazoria County, Texas

Source: GlobeXplorer, USGS Topographic Map,  
"i-cubed", 1:24000, 0.15m, "Color"  
NRC No. 875602  
TDD: TO-0001-08-07-01

DATE  
JULY 2008

PROJECT NO  
20406.012.001.0318.01

SCALE  
AS SHOWN





# MERCURY

CAS # 7439-97-6

## Agency for Toxic Substances and Disease Registry ToxFAQs

April 1999

**This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.**

### What is mercury?

(Pronounced mŭr'kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

### What happens to mercury when it enters the environment?

- ☐ Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- ☐ It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.

- ☐ Methylmercury may be formed in water and soil by small organisms called bacteria.
- ☐ Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

### How might I be exposed to mercury?

- ☐ Eating fish or shellfish contaminated with methylmercury.
- ☐ Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- ☐ Release of mercury from dental work and medical treatments.
- ☐ Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- ☐ Practicing rituals that include mercury.

### How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

### How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

### How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

### How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from

rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

### Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

### Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m<sup>3</sup>) and 0.05 mg/m<sup>3</sup> of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



**ATSDR Suggested Action Levels**



## **Suggested Action Levels for Indoor Mercury Vapors in Homes or Businesses with Indoor Gas Regulators**

**Purpose:** This document is intended solely as a quick reference guide for use by public health and environmental officials in evaluating data collected from structures in which mercury pressure regulating devices for natural gas meters were moved from inside to outside the structures as part of a modernization process. It does not provide detailed justifications for environmental sampling requirements, as health consultations or environmental sampling plans may do.

In the past, ATSDR has been reluctant to provide a list of suggested action levels such as this because of the site specific nature of exposures. ATSDR has recognized that action levels can differ according to differing populations, exposure durations, concentrations, and specific hazards. However, the immediacy and extent of the potential health risk associated with mercury contamination in the present situation require publication of this guide. Many parts of the country may be affected by the possible exposure to mercury resulting from re-positioning of mercury-containing gas pressure regulators and the subsequent response efforts of gas utilities, public health and environmental officials. Moreover, the involvement of multiple health and environmental jurisdictions creates a need for consistency in presenting health risk information. Therefore, ATSDR, at the request of a state health department and an U.S. EPA regional office, is attempting to provide suggested action levels for various response activities under different exposure scenarios.

**Background:** In this context, an *action level* is an indoor air concentration of mercury vapor, which should prompt consideration of the need to implement a recommended response by public health and environmental officials. The various suggested action levels provided in this document are intended as recommendations, not as regulatory values or cleanup values, although some may correspond to present or future values adopted by regulatory authorities.

The suggested action levels presented in this document recognize that an individual must be exposed to a sufficient concentration over some specific period of time in order for mercury vapor to cause adverse health effects. The suggested action levels also recognize that while individual susceptibility may vary, developing fetuses and young children under six years old are generally at higher risk than others of incurring adverse health effects from exposure to mercury vapor. If the indoor air concentration corresponding to any suggested action level is exceeded, then a potential health risk may be present, and responders should evaluate the exposures at that location and consider implementing appropriate protective measures to reduce or eliminate the risk.

The suggested action levels presented here are based on data available in ATSDR's Toxicological Profile for Mercury (1999) or in the Hazardous Substance Databank of the Toxicology Data Network at the National Library of Medicine. ATSDR has also made use of additional data collected by the US Environmental Protection Agency (EPA) and of specific experiences of ATSDR at other sites. Other factors considered in the development include available information on normal background levels and analytical detection limits of various techniques for evaluating airborne contamination. Any information specific to the exposures at any given location as described below should also be considered before implementing a response action.

These suggested action levels are extrapolated from health guidance values (HGVs) independently developed by two federal agencies, ATSDR and EPA. These HGVs are based on both animal studies and human epidemiology studies that detail the health effects of inhalation of mercury-contaminated air. ATSDR has developed a chronic Minimal Risk Level (MRL) of 0.2 ug/m<sup>3</sup> that is based on a 1983 study of workers exposed to an average Lowest Observed Adverse Effect Level (LOAEL) of 26 ug/m<sup>3</sup> over an average of 15 years. This workplace average exposure was adjusted from a 40 hour per week exposure to a 168 hour per week exposure (i.e., 24 hours/day, 7 days/week) and then divided by an uncertainty factor of 30 to account for the use of the LOAEL and the different sensitivities of individuals. In addition, EPA has used the same study to develop a Reference Concentration (RfC) of 0.3 ug/m<sup>3</sup>, using different assumptions and uncertainty factors. ATSDR considers the RfC and the Chronic MRL to be the same value for all practical purposes. An MRL, then, is defined as an estimate of the daily exposure level to a hazardous substance (in this case, metallic mercury) that is likely to be without appreciable risk of adverse, non-cancer health effects (metallic mercury is not

considered to be a carcinogenic substance) over a specific exposure route and duration of exposure. For further information, see Section 2.5, Chapter 7, and Appendix A of the ATSDR Tox Profile and the EPA's Integrated Risk Information System (IRIS) on the Internet at [www.epa.gov/ngispgm3/iris/index.html](http://www.epa.gov/ngispgm3/iris/index.html).

The suggested action levels in the tables below were designed for a group of structures where pressure regulators using approximately 2 teaspoons (and perhaps more) of mercury (~10 ml or 135 g) and the accompanying gas meters were re-positioned from the interior of buildings (including homes) to the exterior. During this adjustment of regulator location that may have taken place some time ago, mercury was spilled in some instances. However, spills of mercury may not have occurred indoors. Therefore, the categories of exposure include (a) buildings that may have had no spills; (b) buildings that had spills and needed cleanup but had air mercury levels that constitute no immediate health risk; and (c) buildings that had spills resulting in indoor air concentrations sufficient to warrant isolating humans from the exposure. In general, the screening for these homes or businesses consists of: (1) confirming that a natural gas meter had been in the building and moved outside; (2) observing the area where the gas meter had been originally for metallic mercury; (3) asking the resident if they had ever noticed metallic mercury in the vicinity of the gas meter; and, (4) evaluating the area with a Jerome™ meter or the equivalent. If there is any positive indicator of mercury on the Jerome Mercury Vapor Analyzer (a real-time air monitoring instrument) that cannot be explained by interferences, then the building is placed on the list for further characterization.

Visible mercury is not only a source of vapors but also a tracking hazard and an attractive nuisance. No matter what the airborne concentration is, free liquid mercury may pose a problem in the general population. Generally, a condition that no visible mercury be present is stipulated only at stages when cleanup is completed. This condition may be considered as much a check on the data quality as anything else. It is rare that liquid mercury exists at concentrations as low as would be considered safe in most exposure scenarios other than a workplace where mercury is used in the production process.

**General Exposure Assessment Considerations:** The primary route of entry for metallic mercury is by inhalation; ingestion and skin absorption of this form of mercury is usually not biologically significant. Sensitive populations to mercury exposure are those with developing central nervous systems, including young children and the fetuses of women who are pregnant. Other individuals of potential concern are those with pre-existing kidney conditions, usually at exposures to much higher concentrations than the first group. The specific exposure of these groups in any given situation should be considered when assessing the need for any given response action. Specific concerns are mentioned in the tables below. If there is any doubt, responders should consult with state or local public health officials before deciding on a course of action. Responders may also contact ATSDR at 404-639-0615, 24 hours a day.

**Exposure Assumptions for Different Settings:** For the purposes of this document, the residentially exposed population includes infants, small children, and pregnant women presumed to have inhaled mercury for a period up to 24 hours per day, 7 days per week potentially for months or even years. Occupational or commercial settings include those individuals that are primarily healthy adults exposed up to 8-10 hours per day, 40 hours per week, with transient exposures by sensitive populations (e.g., a retail establishment or schools). The concentrations provided as suggested action levels are for comparison to the environmental data collected in affected residences and workplaces.

**Suggested Action Levels for Mercury (CAS # 7439-97-6) – Residential Settings <sup>†</sup>**

<b>Indoor Air Concentration (ug/m<sup>3</sup>)</b>	<b>Use of the Action Level</b>	<b>Rationale for Action Level</b>	<b>Method of Analysis *</b>	<b>Reference</b>
≤1.0	Level acceptable for occupancy of any structure after a spill (also called the residential occupancy level.)	A spill occurred in this building, and the risk manager needs to know if the building is safe for occupancy. ATSDR would prefer no one ever be chronically exposed to concentrations above the MRLs; however, experience has shown cleanup operations in a response to concentrations below 1 ug/m <sup>3</sup> can be extremely disruptive to individual and family quality of life. While this concentration is slightly above HGVs, this level is still 25 times lower than the human LOAEL on which the MRL is based. An indoor air concentration of 1 ug/m <sup>3</sup> , as measured by the highest quality data (e.g., NIOSH 6009 or equivalent), is considered safe and acceptable by ATSDR, provided no visible metallic mercury is present.	NIOSH 6009 or equivalent	Based on HGVs above. ATSDR, 1999. EPA/IRIS
No qualitative detection on an Arizona Instrument's Jerome™ Meter.	Screening level for homes that had indoor gas meters with no evidence of a spill	Mercury was present in the regulator inside the home, but no evidence of a spill is found. The qualitative detection limit of the most commonly available air monitoring instruments approximates 1 order of magnitude below levels of known human health effects. As there was no spill, no visible metallic mercury should be present. Natural ventilation (e.g., windows, HVAC air changes, etc.) should reduce any concentration even lower with no disruption of family life or costs.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	
10	Isolate residents from the exposure	When adjusted from an intermediate to chronic exposures to a continuous exposure scenario (i.e., 24 hrs/day, 7days/week), this concentration approaches levels reported in the literature to cause subtle human health effects. Applied to acute exposures with good accuracy by real-time instruments, this value allows for interventions before health effects would be expected. Whenever possible, the mercury vapors should be prevented from reaching living spaces rather than temporarily relocating individuals. See the building evaluation protocol developed for these situations in your area and Section 2.1 of ATSDR's Toxicological Profile.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	ATSDR, 1999.
10	Acceptable level in a modified test procedure to allow personal effects to remain in the owner's possession	For personal effects, such as clothing, warmed in a discrete plastic container much smaller than a typical room (e.g., a garbage bag), this concentration in the air trapped inside the container is considered safe by ATSDR based on a number of factors.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	

\* - Environmental analysis should be in accordance with the requirements specified by environmental authorities. When real-time air monitoring instruments are specified in this table, laboratory analysis may be substituted at the discretion of the risk managers involved in the event. Operation of real-time instruments should be in accordance with manufacturer's instructions.

<sup>†</sup> - Structures where mercury pressure regulating devices for natural gas meters were moved from inside the structure to outside the structure.

**Suggested Action Levels for Mercury (CAS # 7439-97-6) – Occupational and Commercial Settings <sup>†</sup>**

<b>Indoor Air Concentration (ug/m<sup>3</sup>)</b>	<b>Use of the Action Level</b>	<b>Rationale for Action Level</b>	<b>Method of Analysis *</b>	<b>Reference</b>
3.0	Re-occupancy after a spill of an occupational or commercial setting where mercury is not usually handled.	Based on residential occupancy level but adjusted for the shorter duration exposures typical of most workplaces. This concentration approximates one order of magnitude below levels of known human health effects, provided no visible metallic mercury is present to act as an attractive nuisance or a source for more vapors. Those exposed in this instance would not expect hazards associated with mercury as part of their normal work and may include transient exposures by more sensitive individuals (e.g., retail facilities).	NIOSH 6009 or equivalent	HGVs. ATSDR, 1999. EPA/IRIS
25	Occupational settings where mercury is handled. •	Based on the 1996 ACGIH TLV. Assumes hazards communications programs as required by OSHA; engineering controls as recommended by NIOSH; and medical monitoring programs as recommended by the ILO, NIOSH, and ACGIH are in place. This concentration is ½ the peer-reviewed 1973 NIOSH REL and 1/4 the regulatory 1972 OSHA PEL. See HSDB at toxnet.nlm.nih.gov/sis on the Internet.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	HSDB, 1999
25	Response Worker Protective Equipment Upgrade. •	Response workers subject to HAZWOPER should evaluate need to upgrade protective equipment. Based on the 1996 ACGIH TLV. Assumes hazards communications programs as required by OSHA; engineering controls as recommended by NIOSH; and medical monitoring programs as recommended by the ILO, NIOSH, AND ACGIH are in place. This concentration is half the peer-reviewed NIOSH REL and a quarter of the regulatory OSHA PEL. See HSDB at toxnet.nlm.nih.gov/sis on the Internet. For these workers, engineering controls are not typically in place, and it is not possible to control the exposure by other safety techniques.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	29 CFR 1910.120; 40 CFR 311; NIOSH, 1987
10,000	IDLH. Response Workers Protective Equipment upgrade.	Response workers subject to HAZWOPER should upgrade protective equipment. See <a href="http://www.cdc.gov/niosh/idlh/">http://www.cdc.gov/niosh/idlh/</a> on the Internet.	Real-time Air monitoring instrument (i.e., Jerome™ meter or equivalent)	29 CFR 1910.120; 40 CFR 311; NIOSH 1987

\* - Environmental analysis should be in accordance with the requirements specified by environmental authorities. When real-time air monitoring instruments are specified in this table, laboratory analysis may be substituted at the discretion of the risk managers involved in the event. Operation of real-time instruments should be in accordance with manufacturer's instructions.

<sup>†</sup> - Structures where mercury pressure regulating devices for natural gas meters were moved from inside the structure to outside the structure.

• - Women workers in these settings who are pregnant or attempting to become pregnant should consult their physicians regarding their mercury exposure.